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—— The study of these problems, we would add, will tend to throw light on the life and death of species, of genera, families and orders of plants and animals.

At present the causes of the extinction of the life of species and higher categories are interwoven with those of the origin of species. To say that species like individuals have their appointed time is a mere platitude. It is now beginning to be understood that geological extinction was due mainly to changes of land and water in the growing continents, and to consequent lack of adaptation to the new conditions on the part of those organisms which were unsuccessful in the struggle for existence. Thus the apparent lack of continuity in a part of the life which stocked the earth in former ages was due to the lack of adaptation. But life as a whole has always been continuous, perennial; the breaks were the result of more or less local breaches of continuity in the continent-making processes. The youth, maturity and senility of individuals is, as Hyatt has shown, paralled by the youth, maturity and decline of the types to which they belong; and we can now begin to see how correlated and continuous are the phases of what we call life and death in the material world, and throughout all time, and all forms of life.

RECENT LITERATURE.

Brauer's Studies on Dipterous Larvæ.[1]—This is a most valuable addition to our knowledge of the early stages of the Diptera, and is the result of a large acquaintance with the early forms of this order, by one who has for over twenty years devoted special attention to these insects. In his "Monographie der Œstriden," 1865, but more especially in his "Kurze Characteristik der Dipteren-larven," 1869, wide gaps in our knowledge of the transformations of the Diptera were filled. And now with the present work, in addition to the observations of the earlier entomologists, and the recent writings of Fritz Müller, Dewitz and Wierzejski on the transformations of the Blepharoceridæ, and of Handlirsch on the Nemestrinidæ, we are in possession of a knowledge of the larval stages of one or more species of all the natural families of Diptera. After lengthy remarks on the systematic relations of different groups of Diptera, based on the larval characters, Brauer states that the typical, inherited feature in the entire group of Dipterous larvæ appears to be the position of the brain (kopfganglien), whether it is contained in a head-capsule, or free, *i. e.*, far behind the mouth or immediately behind the chitinous cap-

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[1] *Die Zweiflügler des Kaiserlichen Museums zu Wien.* III. Systematische studien auf Grundlage der Dipteren-larven nebst einer zusammenstellung von Beispielen aus der Literatur über dieselben und beschreibung neuer Formen. Von Prof. Dr. Friedrich Brauer. Mit 5 Tafeln. Besonders abgedruct aus dem XLVII Bande de Bande. Math.-Naturw. Cl. k. Akad. der Wissensch. Wien, 1883. 4to, pp. 100.

sule (kiefer-kapsel), supporting some of the mouth-parts, and containing the œsophagus. Less important characteristics are then enumerated. A very unsafe character is the number of visible body-segments, since in some they are often not true segments, but intermediate rings arising from the lengthening of the membrane connecting the true segments (Polytoma); in others a secondary annulation of the single segments, whose true limits in the living animal can be best determined by the markings repeated on the true segments (Ceraplatus); or they appear to be reduced in number through the coalescence of the anterior or hinder segments (Blepharocera, Liponeura, Culex, Simulium, etc.); or any external segmentation is almost wholly wanting (Eristalis, Microdon, etc.).

Thus we may count in the Polytomous larvæ behind the maxillary capsule (we do not know how better to translate *kiefer kapsel*) 20–21 segments; in the Cecidomyid larvæ 13 segments; in the Tabanidæ and Stratiomyidæ 11 segments; in the Leptidæ 11–12; in the Tipulidæ 12, as also in the Asilidæ, Nemestrinidæ and in the Muscidæ.

"In the Muscidæ, Æstridæ, etc., the larval body is regarded as 12-segmented. This is based on the view that the antennal segment enclosing the mandible (mundhaken), which in all the cyclorrhaphous larvæ remains membranous, while in the Orthorrapha (except Lonchoptera) it is above firm and chitinous, forming a ring bearing the antennæ and jaws, which we have termed the kiefer-kapsel. On the other hand the cyclorrhaphous larvæ have, behind the antennal-bearing segment, only eleven true segments—three thoracic and eight abdominal segments. The first or antennal segment must especially be regarded as complex, since it encloses the kiefer-kapsel and bears the antennæ. As to the disappearance of a ninth abdominal segment, which is distinct in some larvæ, the embryonic development must give the clue, though the terminal segment in a good many forms is plainly formed of two segments (Blepharoceridæ, etc.)."

While the view as to the head-segments is a practical one, and of value from a systematic point of view, we wonder that Dr. Brauer has not adopted the broad morphological view, based on the well-known facts in the embryology of Diptera, that the head of any dipterous insect is at first, like that of other insects, composed of four segments, *i. e.*, an antennal, mandibular, first maxillary and second maxillary; the peculiar modification in the dipterous larvæ being the result of degradation; the adaptation of form and structure in these larvæ to their varying surroundings being very marked. It seems to us that the larvæ of Eucephala (Chironomus, etc.) represent the primitive form of dipterous larvæ, the headless forms, or maggots, being the result of adaptation. It was, however, Dr. Brauer's intention not to enter into these questions in the present essay, but simply to describe them for the practical needs of the entomologist. The homologies of the larval mouth-parts with those of other insects he does not discuss, though he apparently does not consider them to show such homologies; though Weismann regarded the mouth-parts of the muscid and other larvæ to be consolidated mandibles.

Brauer then lays down the characters of the dipterous larvæ in general, and discusses the value of the larval characters in classification. We have no space to condense the statements as to the characteristics of the metamorphosis of the different groups, or to present the convenient tabular view on p. 11. We note, in passing, that Dr. Brauer makes no reference to the Pulicidæ, which he evidently does not consider as Diptera; but with larvæ so closely resembling the encephalous larvæ (Mycetophilidæ), we do not see how some discussion of their affinities or even structure could well have been avoided in an essay of the scope of the present one.

Then follows a lengthy and interesting tabular view of the nervous systems of the larval as compared with the adult Diptera. This is succeeded by a section on the characters of the sub-orders and families; this occupies the greater part of the work, and is of prime importance. It is followed by short descriptions of a few larvæ of the families Tabanidæ, Leptidæ, Dolichopidæ and Empidæ.

The systematic list of descriptions of known dipterous larvæ with the bibliographical references (pp. 46–93), will be of the greatest use, especially to American entomologists; its compilation was a laborious undertaking; it appears to be very full and accurate, though we notice the omission of any reference to the description and figures of *Chironomus oceanicus* Pack., but such omissions must be few. The full index to the genera is a valuable feature. The plates, like all the author's artistic work, are excellent.

The Diptera are, without doubt, the most difficult order of insects, and Dr. Brauer, in giving us these results of ten years' labor on their larval forms, has laid entomologists under lasting obligations. The work will be of value to the systematist as well as to the economic entomologist, while the general biologist will find it a storehouse of facts bearing on the evolutionary problems of the day.

DECANDOLLE'S ORIGIN OF CULTIVATED PLANTS.[1]—The aim of the author in this work has been to inquire into the condition and habitat of each species before becoming cultivated. Over how wide a range of inquiry, antiquarian, historical and botanical this has led the learned author, may be seen by glancing over the

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[1] *Origin des Plantes cultivées.* Par ALPH. DECANDOLLE. Bibliotheque scientifique internationale, XLIII. Paris, 1883. 12mo, pp. 378.